BS in Computer Science

Degree Program Description

Computer Science emphasizes the study of algorithms, programming methodology, software systems, computational theories and algorithms, computer organization, networking, computer graphics, cyber-security, machine learning, artificial intelligence, high performance computing, and database. In the two-semester capstone design courses, students complete design projects that serve as a culminating academic experience. Internships with companies for real-world experience and undergraduate research opportunities with faculty are abundant and encouraged. Students who complete the BS in Computer Science can work for government agencies, academic institutions, or private industry creating and applying new technologies to solve complex problems, or attend graduate schools.

Major Program Requirements

The Bachelor of Science with a major in Computer Science emphasizes the study of software systems, computational theories and algorithms, computer organization, networking, and programming methodology. Students who complete the BS in Computer Science can work for government agencies, academic institutions, or private industry creating and applying new technologies to solve complex problems.

The BS degree requires the completion of the three-semester calculus sequence plus discrete math and statistics. A student who selects an appropriate additional math course as a technical elective and has at least 9 credits in math with appropriate grades at MU can earn a math minor.

The BS degree requires the completion of 120 credits. Computer Science students must pass all CS core courses that are prerequisites for other CS core courses that the student takes with a C or better grade. All other CS core courses must be passed with a C- grade or better. To graduate, a student must earn an overall GPA of 2.0 or better and a 2.0 GPA or better in all CS or IT courses.

The Engineering Leadership, Engagement & Career Development Academy, W1025 Lafferre Hall, can assist students in searching for employment opportunities upon graduation and for internship/co-op positions.

Course requirements listed here apply to students beginning as regular college freshmen in Fall 2019 or after. A student who started college before Fall 2019 and who has been continuously enrolled as a full-time student may be pursuing the previous program and should contact the department for information on these degree requirements.

In addition to the major core requirements, students must complete all University graduation requirements (https://catalog.missouri.edu/academicdegreerequirements/universityrequirements/) including University general education (https://catalog.missouri.edu/academicdegreerequirements/generaleducationrequirements/), as well as all degree and college or school requirements.

Major Core Requirements

All core CS Courses that are a pre-requisite need to have a C or better to pass (Otherwise the other core courses need a C- to pass)

Computer Science Core Courses		**42**
CMP_SC 1000	Introduction to Computer Science **	1
or ENGINR 1000	Introduction to Engineering	
ENGINR 1050	Foundations of Engineering **	2
CMP_SC 1050	Algorithm Design and Programming I	4
CMP_SC 2050	Algorithm Design and Programming II	4
CMP_SC 2270	Introduction to Logic Systems	3
CMP_SC 3050	Advanced Algorithm Design	3
CMP_SC 3280	Computer Organization and Assembly Language	3
CMP_SC 3330	Object Oriented Programming	3
CMP_SC 3380	Database Applications and Information Systems	3
CMP_SC 4050	Design and Analysis of Algorithms I	3
CMP_SC 4320	Software Engineering I	3
CMP_SC 4520	Operating Systems I	3
CMP_SC 4850	Computer Networks I	3
CMP_SC 4970W	Senior Capstone Design I - Writing Intensive	3
CMP_SC 4980	Senior Capstone Design II	3
ENGINR 1000/ENGINR 1050/CMP_SC 1000 Waiver: Students with 60 or more credits have completed the ENGINR 1000/ENGINR 1050/ CMP_SC 1000 Requirement		
Computer Science Electives		**24**
At least 18 credit hours of computer science electives must be numbered above 4000; one of the 4000-level courses must be CMP_SC 4410 or CMP_SC 4450. A maximum of 6 hours of 3000/4000-level IT courses (excluding INFOTC 4400 and INFOTC 4500) can be taken as CS electives but are counted as lower level (below 4000) CMP_SC courses. INFOTC 4400, INFOTC 4500, ECE 3220, and ECE 4220 are counted as CS 4000 level courses. Students may also take up to six hours of problems or research courses, and up to three hours of CMP_SC 3940 internship credit.		
All CS electives, and general education need a D- to pass		
CMP_SC 2010	Intellectual Property for Engineers	3
CMP_SC 2830	Web Application Development I	3
CMP_SC 3085	Problems in Computer Science	1-6
CMP_SC 3530	UNIX Operating System	3
CMP_SC 3940	Internship in Computer Science	1-3
CMP_SC 4001	Topics in Computer Science	1-99
CMP_SC 4060	String Algorithms	3
CMP_SC 4070	Numerical Methods for Science and Engineering	3
CMP_SC 4080	Parallel Programming for High Performance Computing	3
CMP_SC 4270	Computer Architecture	4
CMP_SC 4330	Object Oriented Design I	3
CMP_SC 4350	Big Data Analytics	3
CMP_SC 4380	Database Management Systems I	3
CMP_SC 4405	iOS App Development I	3
CMP_SC 4410	Theory of Computation I	3
CMP_SC 4430	Compilers I	3
CMP_SC 4440	Malware Analysis and Defense	3
CMP_SC 4450	Principles of Programming Languages	3
CMP_SC 4460	Introduction to Cryptography	3
CMP_SC 4530	Cloud Computing	3
CMP_SC 4540	Neural Models and Machine Learning	3
CMP_SC 4610	Computer Graphics I	3
CMP_SC 4620	Physically Based Modeling and Animation	3

CMP_SC 4630	Game Development	3
CMP_SC 4650	Digital Image Processing	3
CMP_SC 4670	Digital Image Compression	3
CMP_SC 4720	Introduction to Machine Learning and Pattern Recognition	3
CMP_SC 4730	Building Intelligent Robots	4
CMP_SC 4740	Interdisciplinary Introduction to NLP	3
CMP_SC 4750	Artificial Intelligence I	3
CMP_SC 4770	Introduction to Computational Intelligence	3
CMP_SC 4830	Web Application Development II	3
CMP_SC 4910	Digital Forensics	3
CMP_SC 4990	Undergraduate Research in Computer Science	0-6
CMP_SC 4995	Undergraduate Research in Computer Science - Honors	1-6
INFOTC 4400	C#/.NET Development	3
INFOTC 4410	Android App Development I	3
INFOTC 4420	Android App Development II	3
INFOTC 4500	Team-Based Mobile Device Application Development	3
ECE 3220	Software Design in C and C++	3
ECE 4220	Real Time Embedded Computing	3
Any CMP_SC 4000 Level and Above Course		
Math Courses		**19**
MATH 1500	Analytic Geometry and Calculus I	5
MATH 1700	Calculus II	5
MATH 2300	Calculus III	3
MATH 2320	Discrete Mathematical Structures	3
STAT 4710	Introduction to Mathematical Statistics	3
or MATH 4315	Introduction to Mathematical Statistics	
Technical Electives		**6**
Technical electives can be 2000 level and above CS or IT courses, 4000 level Math courses, any 4000+ level statistics course, 2000 level and above Engineering courses, IS_LT 4099, MANGMT 3000, MRKTNG 3000, FINANC 3000, and other courses that meet the prior approval of the student's CS advisor. All technical electives taken outside the CS Department must meet the prior approval of the student's CS advisor.		
Science Courses		**minimum 7**
One of the following 2-semester sequences has to be taken (at least one of the courses must include a lab). Labs listed separately are not considered a 2nd science course (for example, BIO_SC 1010 and BIO_SC 1020 count as one science course).		
Physics sequence:		
(credit not given for both PHYSCS 1210 and PHYSCS 2750, or PHYSCS 1220 and PHYSCS 2760)		
PHYSCS 1210 & PHYSCS 1220	College Physics I and College Physics II	8-10
or PHYSCS 2750 & PHYSCS 2760	University Physics I and University Physics II	
Chemistry sequence:		
CHEM 1400 & CHEM 1401	College Chemistry I and College Chemistry I Laboratory	4
CHEM 1410 & CHEM 1411	College Chemistry II and College Chemistry II Laboratory	4
Biology sequence:		
BIO_SC 1010 & BIO_SC 1020	General Principles and Concepts of Biology and General Biology Laboratory	5
BIO_SC 1030	General Principles and Concepts of Biology with Laboratory	5
BIO_SC 1200	General Botany with Laboratory	5
BIO_SC 1500	Introduction to Biological Systems with Laboratory	5
BIO_SC 3210	Plant Systematics	4
BIO_SC 3260	Invertebrate Zoology	4
BIO_SC 3650	General Ecology	5
BIO_SC 3700	Human Physiology	5
BIO_SC 3710 & BIO_SC 3715	Introductory Entomology and Insect Diversity	5
BIO_SC 3750 & BIO_SC 3760	General Microbiology and Microbiology Laboratory	5
BIO_SC 2200 & BIO_SC 3780	General Genetics and Genetics Laboratory	6
BIO_SC 4400	Plant Anatomy	4
BIO_SC 4590	Computational Neuroscience	4
BIO_SC 4640	Behavioral Biology	4
BIO_SC 4990	Vertebrate Histology and Microscopic Anatomy	5
Select one of the following:		
BIO_SC 2100	Infectious Diseases	3
BIO_SC 2150	Genetic Diseases	3
BIO_SC 3050	Genetics and Society	3
BIOCHM 2110	The Living World: Molecular Scale	3
BIOCHM 2112	Biotechnology in Society	3
ANTHRO 2051 & ANTHRO 2052	Introduction to Biological Anthropology and Biological Anthropology Laboratory	5
or ANTHRO 2050	Introduction to Biological Anthropology with Laboratory	
Or any other 4-5 credit biological science course with a laboratory		
Geology sequence:		
GEOL 1100	Introduction to the Earth with Laboratory	4
or GEOL 1200	Environmental Geology with Laboratory	
Select one of the following:		
GEOL 2150	The Age of the Dinosaurs	3
GEOL 2300	Earth Systems and Global Change	3
GEOL 2350	Earth and Life Through Time	3
GEOL 2400	Surficial Earth Processes and Products with Laboratory	4
GEOL 2600	Mineral and Energy Resources of the Earth	3
General Requirements		
1. ENGLSH 1000 - Exposition and Argumentation - 3 hours "C" range grade is required		
2. Complete at least 9 hours in each of the following categories. One course in one of the categories must be numbered 2000 or higher. A list of MU courses that count for social sciences, behavioral sciences, and humanities can be found at: http://generaleducation.missouri.edu/courses/.		
(1) Humanities/Fine Arts - Must include COMMUN 1200 Public Speaking and courses from at least two different departments		
(2) Social/Behavioral Sciences - Must include courses from at least two different departments and fulfill the Missouri Constitutional Requirement.		

3. Complete enough elective hours to bring the total credit hours that count towards the degree to 126. The electives may not include remedial courses (i.e., MATH 1100, MATH 1160).

4. Two courses must be designated “Writing Intensive.” A C-range grade in ENGLSH 1000 is a prerequisite for all WI courses. A C-range grade is required in the WI courses. The required course CMP_SC 4970 (Senior Capstone Design I) is writing intensive and counts as one of these courses. For more information on WI guidelines and courses, visit https://cwp.missouri.edu/.

Accelerated BS to MS in Computer Science

The accelerated option will allow students to earn a bachelors and masters degree within five years. Eligible students who have completed at least 90 credit hours with a cumulative GPA of 3.0 or higher. The academic requirements of the accelerated MS program will require a total of 30 graduate credit hours, to graduate. Accepted undergraduate students can take up to 15 hours of graduate level courses that will count toward both the undergraduate and the graduate degrees. The shared-credit graduate-level courses should be elective courses. Once the student has completed 120 credit hours, (includes 12-15 credit hours of dual enrollment), the corresponding bachelor’s degree will be conferred and they will become graduate students in our MS program to complete the remaining 18 hours of graduate credit. A minimum of 15 credit hours must be from courses at the 8000 level or above and no more than 9 credit hours can be from a combination of research and/or problems courses. The student's graduate course GPA must be 3.0 or greater.

Total credits required for graduation must be at least 144 total credit hours:

- Total undergraduate credit hours: 120
- Total dual enrollment credit hours: 12-15
- Total graduate credit hours: 30

Thesis/Non-Thesis Option

During the program, students will conduct an independent study that will result in a thesis or project report, under the guidance of their graduate advisor. In their last semester in the program, they must defend their thesis or project in front of an examination committee composed of their graduate advisor and at least two other faculty members.

Semester Plan

Below is a sample plan of study, semester by semester. A student's actual plan may vary based on course choices where options are available.

First Year					
Fall	**CR**		**Spring**		**CR**
CMP_SC 1000 or ENGINR 1000		1	CMP_SC 2050*		4
CMP_SC 1050*		4	CMP_SC 2270		3
MATH 1500		5	MATH 1700		5
COMMUN 1200		3	Constitutional Elec Soc/Beh Science		3
ENGLSH 1000		3	ENGINR 1050		2
		16			**17**
Second Year					
Fall	**CR**		**Spring**		**CR**
CMP_SC 3050		3	General Elective Humanities		3
CMP SC 2000 Level or Higher/IT 3000 Level or Higher		3	CMP_SC 3330		3
MATH 2300		3	Science Sequence II		4-5
Science Sequence I		4-5	Soc/Beh Science Elective		3
General Elective (Humanities)*		3	MATH 4315 or STAT 4710		3
		16-17			**16-17**
Third Year					
Fall	**CR**		**Spring**		**CR**
CMP_SC 3280		3	CMP_SC 4050		3
CMP_SC 3380*		3	CMP_SC 4320*		3
Tech Elective		3	CMP SC Elective 4000 level		3
MATH 2320		3	CMP SC Elective 4000 level		3
Tech Elective		3	CMP SC Elective 4000 Level		3
		15			**15**
Fourth Year					
Fall	**CR**		**Spring**		**CR**
CMP_SC 4520		3	CMP_SC 4850		3
CMP_SC 4970W*		3	CMP_SC 4980		3
CMP_SC 4410 or 4450		3	CMP SC Elective 4000-level		3
CMP_SC 2000 Level or Higher/ IT 3000 Level or Higher or Internship **		3	CMP SC elective 4000-level		3
General Elective (Soc/Beh)		3	General Education (if needed)		2-4
		15			**14-16**

Total Credits: 124-128

* Indicates Required 6 Semester Course Sequence for Capstone.

** Internships can count for credit in the CS Program. You must get approval prior.